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1980 AGRICULTURAL OUTLOOK

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214 ENERGY INPUTS []

(By Weldon L. Barton, Director, Office of Energy, Office of the Secretary, U.S. Department of Agriculture)

SUMMARY OUTLOOK

Long-term decisions on energy usage in agriculture should be based on the premise that fossil fuels will continue to diminish in supply and must be replaced with renewable energy sources. In 1980, the energy price and supply situation will be marked by global political considerations and rather ambiguous economic factors. Under those conditions, our prudent forecast is that supplies of petroleum fuels will remain tight and prices will continue to increase, with the extent of increase obscured by factors largely unpredictable at the present time.

With tight supplies expected and with energy representing an increasing percentage of total variable costs in agriculture, we can expect producers to seek additional hedges against supply and price instability. Unless an acute shortfall occurs during 1980, requiring a governmental rationing system, we might expect a continuation during 1980 of selective intervention by Government to assist in managing scarcities and spot shortages of gasoline, diesel, and other fuels with the minimum necessary enforcement of formal regulations.

I. PLACING U.S. ENERGY SUPPLIES IN GLOBAL PERSPECTIVE

In order to understand why we cannot forecast the U.S. supply and price situation for 1980 with any confidence (except that supplies will remain tight and prices will continue to increase), we need to place the U.S. petroleum energy situation in worldwide perspective.

The following aspects are important:

In 1978, world production of petroleum averaged about 59.9 million barrels per day, of which 43.1 million barrels (72 percent) was sold in world trade. Of this, the United States produced about 8.5 million barrels of petroleum per day and imported 7.9 million barrels per day; imports therefore were about 48 percent of total petroleum available to the United States.

The percentage of petroleum sales by oil-producing countries directly to individual importing countries, or to private oil handlers within those countries, at "spot" prices has increased substantially, compared to the percentage of sales made to the major oil companies under long-term contract. In 1974 when the International Energy Agency (IEA) emergency oil-sharing plan was formulated, major oil companies handled about 80 to 85 percent of the oil supplied to the 19-member IEA group of countries.

Currently, sales by Organization of Petroleum Exporting Countries (OPEC) directly to countries or handlers within the countries, rather than under contracts with the major oil companies, are estimated to total about 15 million barrels per day, or 50 percent of total OPEC exports. This has resulted in greater instability of the price of oil in world trade, and in reduced ability of the major oil companies informally to allocate supplies among importing countries.

The primary stocks of petroleum and refined oil products held by private suppliers in the United States, while they may be considered "adequate" for the particular season of the year, are not a useful hedge against supply and price instability for any several-months duration. In early 1979, for example, even though at the beginning of the reduction in U.S. imports due to the Iranian situation our privately held stocks of petroleum and product were substantially higher than at the time of the Arab embargo in 1973, those stocks did not forestall upward price pressures. They did not primarily because stock holders sought to maintain their inventory levels and to allocate projected import shortfalls in advance, rather than to draw down domestic stocks to cushion the impact of import reductions. Given the basic economic factors at work in such a situation, the same reaction might be expected to occur in a similar future import reduction situation.

The U.S. strategic petroleum reserve does not contain an adequate volume of readily recoverable stocks to serve as a hedge against foreign supply disruptions. The strategic petroleum reserve currently has 91.7 million barrels in storage, and no additional oil for the reserve is immediately on order. U.S. imports of oil during 1979 have averaged about 8.2 million barrels per day. At that rate, our strategic reserve would cover about 11 days total disruption of imports.

For the time being, therefore, there are essentially no built-in stabilizers of petroleum supplies and prices that would partially offset fluctuations in supply which are essentially uncontrollable (and largely unpredictable) from the perspective of the United States. Even absent a disruption of the type involving Iran in 1979, the tightness of supply available to the United States depends heavily upon decisions made by Saudi Arabia and other major exporting countries on their level of production and export. Furthermore, such decisions by major exporters can offset reductions in U.S. energy consumption due to economic recession or energy conservation.

The "bottom line" of the global liquid fuel situation is that the tightness of supplies available to the United States—and therefore to agricultural and other users in this country—is basically uncontrollable from our perspective until we reduce our dependency on foreign sources and build hedges against short-term disruptions through strategic reserve stocks or other effective mechanisms. Also, it seems prudent to anticipate that a tight supply situation will tend to prevail until these fundamental steps are well underway.

II. ENERGY SUPPLY SITUATION AND OUTLOOK: CONTINUED TIGHT SUPPLY

With respect to energy supply per se, 1979 has been marked by very tight supplies and the selective intervention by the Federal Govern-

ment in order to manage scarcities of gasoline, diesel, and other fuels with the minimum necessary formal regulations. In addition, heavy reliance was placed upon the allocation by individual States of set-aside volumes of diesel and gasoline, in order to afford a flexible response to changing priority requirements within specific States.

Petroleum fuels

Through the first 9 months of 1979, refined petroleum products were consumed at the rate of 18.5 million barrels per day. This is 1.3 percent less than was used during the same period in 1978. Gasoline demand was down 4 percent and distillate use was down 2.7 percent. Use of kerosene and heavy oils was up 10 to 12 percent. Domestic crude oil production at 8.5 million barrels per day declined 1.6 percent from the 8.7 million barrels produced for the same period last year.

Diesel fuel

Diesel fuel has rapidly supplanted gasoline as a power fuel used by farmers. Nearly all new tractors and combines are diesel powered. In 1979 an estimated 3 billion gallons of diesel fuel were used to power tractors, combines, and other farm machines and to operate irrigation pumps. Diesel is also used as fuel in smudge pots to protect tender fruit and vegetable crops from frost damage.

Middle distillate fuels, including diesel, have been in extremely tight supply. After the long, harsh winter of 1977-78, distillate stocks reached a low of 113 million barrels at the end of March. This was well below the normal stock range of 135 to 155 million barrels. Farm demand for the fuel heightened when cold, wet weather delayed farmers' spring fieldwork. A 416-million-gallon demand projected for May on the basis of the April farmers' intentions to plant survey, in effect, became an 800-million-gallon demand because of the compressed field work period. Fuel distributors supplying farmers were unable to obtain sufficient diesel fuel to meet these expanded needs.

The Carter administration invoked mandatory allocation regulations, in the form of special rule No. 9, to deal with this situation. The rule, which entitled agricultural production to full current energy requirements, was in effect from May 10 through June 25. Although some farmers experienced difficulty in obtaining fuel, the crops were planted with a minimum of overall disruption.

Gasoline

Farmers use about 3 billion gallons of gasoline for production purposes annually. It powers tractors, combines, trucks, and automobiles as well as irrigation pumps, chain saws, and small engines for many diverse uses. Since 1974 farmers have had top priority along with defense needs for gasoline under the mandatory petroleum allocation program of the Emergency Petroleum Allocation Act of 1973. On August 1, 1979, the administration modified the gasoline allocation regulations. Now farmers may receive 100 percent of their base period usage instead of 100 percent of current requirements. The base period used is the corresponding month within the period November 1977 through October 1978.

Generally, base period plans have been difficult to implement for agriculture because varying climatic conditions affect farm energy

requirements. The new rule provides some flexibility. If a farmer has more fuel than he needs in a particular month he may defer acceptance of a portion of his base entitlement until the next month. Or, if fuel in excess of his base entitlement is needed for a particular month, he may borrow against his next month's supply. A further adjustment is permitted if farmers' energy needs change as a result of USDA commodity programs. With these flexibilities, it is expected that farmers can obtain sufficient gasoline to meet their agricultural requirements. As farmers shift to diesel powered equipment, their demand for gasoline will be reduced.

Gasoline supplies are currently around 225 million barrels. This is below the normal stock range, but with the distillate target accomplished we can expect refiners to increase the proportion of gasoline-produced relative to distillates and other products.

LP gas

Liquefied petroleum gas (LPG), primarily propane, is used extensively by farmers in a wide variety of applications, ranging from powering tractors, combines, and irrigation pumps to operating poultry and livestock brooders and crop-drying facilities. About 1.5 billion gallons of LPG are used annually by farmers. About half of this amount is used for crop drying.

Worldwide, there has been a surplus of liquefied petroleum products, and the domestic supply had been in surplus prior to 1979. Currently, there is concern that propane stocks may not be adequate to meet farm needs, home heating and cooking requirements, and petrochemical industry demands. As of September 30, propane stocks at 73 million barrels, were 19 percent or 17 million barrels below the 1975-78 average.

Propane remains subject to both price and allocation regulations under the 1973 Emergency Petroleum Allocation Act. Under these regulations, farm producers are entitled to 100 percent of their current requirements.

Natural gas

The Federal Energy Regulatory Commission (FERC) projects adequate supplies of natural gas again this winter. Curtailments of natural gas service by the major interstate pipelines are not expected to result in any significant industrial or commercial dislocation or shutdown. The pipeline companies project available supplies at 6,096 billion cubic feet (bcf) for the 1979-80 winter season as compared to 5,960 bcf last year.¹ In addition to these supplies, deeper storage withdrawals and emergency gas supplies will be available to offset increased requirements in the event that extremely cold weather is experienced regionally.

The Natural Gas Policy Act of 1978 (NGPA) requires interstate pipelines to accord a No. 2 priority to essential agricultural uses—below homes, schools, hospitals, and small commercial uses, but above all other industrial uses. On May 16, 1979, the Secretary of

¹ The FERC has lowered estimates made last year to account for double counting in earlier estimating procedures.

Agriculture issued a rule certifying essential agricultural uses of natural gas, pursuant to section 401 of the NGPA. Included in this certification are on-farm uses, food processing and warehousing uses, as well as process and feedstock uses for the manufacture of fertilizers and other agricultural chemicals.

For farmers, this means that noncurtailment protection will be provided for supplies of natural gas used for irrigation, crop drying, and livestock brooding. In addition, the continued supply of such vital agricultural inputs as fertilizers and pesticides will be more secure. Although curtailments this year are expected to be insignificant, the additional protection which agricultural users enjoy may be vitally important in insuring food and fiber production in years to come.

Electricity

The Department of Energy reports that electrical generating capacity should be adequate to meet peak power demands in 1980. As of July 31 of this year, U.S. generating capacity totaled nearly 592,000 megawatts. Peak power demand this winter is projected at just under 395,000 megawatts, increasing to 448,000 megawatts in the summer of 1980, and decreasing to 416,000 megawatts in the winter 1980-81. Thus, provided there is no sudden and unforeseen surge in electricity demand or major power outages, electricity users should not face any supply problems in the coming year.

Electricity prices in 1980 are expected to be about 8 percent higher than in 1979. In 1979 the average price paid by farmers was just over 4 cents per kilowatt-hour.

III. PETROLEUM PRICES CONTINUE UPWARD CLIMB

Petroleum price increases in agriculture have far exceeded the increases initially forecasted last year at this time for 1979. In the year from September 1978 to September 1979, increases of 49 percent for gasoline and 73 percent for diesel have been reported by farmers. In the 6-year period since the Arab oil embargo, prices paid by farmers have increased 270 percent for gasoline, 380 percent for diesel, and 244 percent for LP gas.

OPEC increases in crude oil prices, along with pricing changes allowed by the Department of Energy, including the decontrol of domestic crude oil prices which began in July, and other factors have resulted in increased prices paid by farmers for gasoline from 83.1 cents per gallon in June to 90.5 cents in September, and for diesel from 72.2 cents per gallon to 81 cents per gallon during the same 3-month period.

Actions currently underway make it relatively certain that substantial price increases for petroleum fuels will occur in 1980. Crude oil price increases for the fourth quarter of 1979 have been announced by Mexico, Kuwait, Iran, Libya, and other producers. The Organization of Petroleum Exporting Countries will meet in December to decide on petroleum price increases, and an OPEC price increase of perhaps \$2 to \$5 a barrel—presently \$18 to \$23.50 per 42-gallon barrel—is expected.

Particularly in view of the growing percentage of world oil supplies which is marketed outside of long-term contracts on a spot basis, the

world petroleum price situation is increasingly unstable and unpredictable. Given the pricing actions already underway, petroleum-based fuel prices paid by farmers in 1980 are likely to increase at least 25 percent compared to end-of-1979 price levels.

Assuming further substantial increases in fuel prices in 1980, fuel costs will continue to increase as a percentage of total variable farm costs. Direct energy costs as a percentage of variable production costs increased during 1975-79 from 6.3 percent to 10.6 percent for corn, from 10.4 percent to 16.5 percent for wheat, and from 5.9 percent to 9 percent for cotton. In some regions and sectors of agriculture—for instance, where deep-well irrigation is required—direct energy costs make up relatively larger percentages of total variable costs.

Despite the current increase in energy costs relative to other farm variable costs, energy inputs continue to represent a small proportion of total costs for raw agricultural products. When all costs are considered, a 10-percent increase in energy cost raises total production costs by an estimated 0.6 percent. Agricultural production is much less energy intensive than manufacturing enterprises such as aluminum, steel mills, petroleum refining, paper mills, and chemicals.

Effect of rising farm energy costs on consumer food prices

If farmers purchase the same amounts of petroleum fuels and electricity as in 1979, they may be paying \$2.5 billion more for their energy input in 1980 compared with 1979. This assumes that petroleum prices rise 25 percent and electricity rates increase 8 percent. Since agricultural producers are price-takers in the short term, the immediate impact of such increases will be a \$2.5 billion reduction in net farm income.

Over time, farmers adjust their operations to account for rising energy input costs. The shift to more energy-efficient diesel powered equipment will continue, and farmers will institute more stringent energy conservation practices. Yet, in the long run higher energy costs will be translated into higher consumer food prices. Ultimately, most of the \$2.5 billion additional fuel cost would be passed to consumers, and would represent roughly a 1 percent increase in retail food prices.

IV. PRODUCER HEDGES AGAINST ENERGY SUPPLY SHORTAGES

There are a number of mechanisms available through which agricultural producers, acting individually or cooperatively, can partially hedge themselves against fuel supply disruptions. These include:

Production and distribution of fuel to producers through producer-owned cooperatives and cooperative associations. Currently, approximately 37 percent of agricultural petroleum requirements are supplied by cooperatives, which give priority to agricultural users in their distribution of fuel.

On-farm storage of fuels. As of 1974, a survey of diesel storage capacity on U.S. farms with annual sales over \$2,500 reported a total of 246.4 million gallons of on-farm storage capacity with an average volume of 658 gallons per farm. A total of 176,097 farms reported storage capacity of 500 gallons or more. Storage data from the 1978 Census of Agriculture will be released by States

beginning next month, which will indicate updated on-farm storage capacity for diesel, gasoline, and other storable fuels. Substantial increases in on-farm storage have occurred recently. Although on-farm storage cannot protect against prolonged shortages of fuel, it can help to assure ready availability of fuel for surges of agricultural activity during planting, harvesting, and other peak periods.

Production of fuel on farms or by farm cooperatives from agricultural products or residues. Although not yet statistically significant as a fuel source, an increasing number of farmers are producing methane gas or alcohol fuels either on their individual farms or on a cooperative basis, so that the fuel is directly available for on-farm use. As of October 19, 1979, the Treasury Department had received 3,498 experimental permit applications and approved 926 of these for the construction and operation of small-scale distilleries for fuel alcohol production. Although no precise data are available as of this date on the specific nature of these projects and the extent of completed construction, many of the experimental permits involve groups of commercial farmers intending to operate a plant on a cooperative basis rather than a strictly individual farm location and operation.

Further attention to these types of hedges against fuel disruptions by individual agricultural producers, or producers acting through cooperatives, can be expected in 1980. Although it is too early to determine the extent and timing of the movement to produce alcohol fuels for on-farm usage, developments in 1980 should provide a better barometer of that situation.

V. GOVERNMENT SUPPLY MANAGEMENT PROGRAMS AND SAFEGUARDS

In addition to agricultural user hedges against supply disruptions, Government management and allocation measures will continue to place high priority on fuels for agricultural production. It must be recognized that agricultural production involves a biological process which is timed by uncontrollable weather conditions. Temporary shortages of essential fuels can create shortages of food through lost production and spoilage. Therefore, priority measures designed to provide dependable fuel supplies for essential agricultural uses are required in the national interest.

There are several mechanisms in place which help to assure adequate energy supplies for farmers. There are State set-aside accounts for both gasoline and diesel fuel, which authorize 4 percent of diesel and 5 percent of gasoline received each month to be disbursed at the Governor's direction to alleviate hardships. Farmers are expected to apply for set-aside fuel if their regular supply is not adequate. Agricultural uses of gasoline currently receive priority of 100 percent of base period use under the Emergency Petroleum Allocation Act, in the event of a serious shortfall. Diesel allocation measures are maintained on a standby basis, to be invoked if conditions warrant. Liquid propane gas use by farmers is given priority under the Emergency Petroleum Allocation Act at 100 percent of current requirements. Agricultural uses of natural gas are afforded protection from curtailments by interstate pipelines, as provided in the Natural Gas Policy Act.

In addition to statutory provisions for assuring energy supplies for farmers, an interagency distillate management group (DMG) composed of USDA, DOE, and DOT officials has been instituted to monitor the distillate supply situation. If shortages develop the DMG will work with distillate suppliers to move products from surplus to deficit areas. The DMG is also in a position to recommend implementation of regulations, such as special rule No. 9, in the event of a special problem situation.

The USDA conducts weekly surveys of farm petroleum supplies. Local farmers report on the diesel fuel, gasoline, and LP gas supplies along with crop conditions and status of operations by crop reporting district. This weekly fuel update serves as a timely barometer of fuel availability and aids in pinpointing potential regional shortages.

In addition to monitoring the fuel situation, the USDA, through local ASCS offices, directly assists farmers in obtaining fuel by seeking additional supplies for farmers who are short, providing necessary forms and instructions, contacting State and regional energy offices, and in some States loaning the State energy offices staff to help handle the caseload of farmer requests for fuel from set-aside accounts. While the USDA has no authority to dispense fuel, farmers in need of petroleum may obtain help at their county ASCS office.

TABLE 1.—AVERAGE PRICE PAID BY FARMERS FOR FUEL¹

[Dollars per gallon]

Year	Unleaded gasoline ²	Regular gasoline ³	Diesel fuel ³	LP gas
1973	0.379	0.331	0.213	0.169
1974	.538	.447	.364	.302
1975	⁵ .585	⁵ .535	⁵ .407	.304
1976	⁵ .590	⁵ .546	⁵ .415	.331
1977	.618	.578	.457	.389
1978	.668	.612	.467	.505
1979	.998	.905	.810	.413

¹ Sept. 15 of each year as reported in Agricultural Prices, Annual Summary, 1978 and in Agricultural Prices, Sept. 28, 1979, Crop Reporting Board, ESCS, U.S. Department of Agriculture.

² Purchased at service stations.

³ Bulk delivery to farm.

⁴ Prior to 1977, based on an annual survey made in July and August, reporting data for most recent bill, usually purchased during April, May, and June.

⁵ Oct. 15 for 1975 and 1976. Prices were reported quarterly in those years.

TABLE 2.—AVERAGE FUEL COST PER ACRE AND VARIABLE COST PER ACRE, 1975-79

Year and crop	Fuel cost per acre	Total variable cost per acre	Fuel as a share of variable cost (percent)
Corn:			
1975	\$5.72	\$91.21	6.3
1976	6.00	86.39	7.0
1977	7.89	96.41	8.2
1978	8.41	98.27	8.6
1979	11.10	104.80	10.6
Wheat:			
1975	4.72	39.50	10.4
1976	4.55	36.20	12.6
1977	4.80	37.24	12.8
1978	5.19	37.64	13.8
1979	6.85	41.35	16.5
Cotton:			
1975	8.43	143.99	5.9
1976	8.98	152.17	5.9
1977	11.45	168.21	6.8
1978	11.98	162.54	7.3
1979	15.81	175.61	9.0